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BASIC FREQUENCY OF A-TEMPORAL PHYSICAL SPACE AS A DRIVING FORCE OF EVOLUTION

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Universal space has a granular structure. It is composed by quanta of space having the size of Planck length. Quanta of a-temporal physical space have the basic frequency and are the "non-entropy state" of energy, while quanta of space constituting subatomic particles vibrate with appropriate different lower frequencies and are the "entropy-state" of energy. Basic frequency of the quanta of space is a driving force of the evolution; it is a physical environment in which matter has a continuous tendency to develop towards life and further on into conscious species. The whole process of evolution from chemical, biological events to the evolution of the human being is a continuous process generated by the basic frequency of quanta of space. Matter has a tendency to rise up its frequency towards the basic frequency of a-temporal physical space. In the areas that have similar physical circumstances to the earth chemical evolution has developed into life and further on into conscious species.

Keywords: a-temporal physical space, frequencies of vibration, entropy, evolution.

1. INTRODUCTION

According to a-temporal gravitation theory universe is a system in dynamic equilibrium that recreates itself. The increase of the entropy of matter is only temporary; it is renewed through the cyclic transformation "matter-space-matter-space…" in the Active Galactic Nuclei (AGN-s). The total entropy of the universe sums to zero (1).

In loop quantum gravity, the elementary grains of space are nodes of spin networks and their volume is given by a quantum number that is associated with the node in units of the elementary Planck volume, $V = \left(\hbar G / c^3\right)^{3/2}$, where $\hbar$ is Planck's reduced constant, G is the gravitational constant and c is the speed of light (2). On the ground of this theoretical result, one can assume that the fundamental constituents of universe are quanta of space (QS) having the size of Planck length.

According to the model presented here, QS as "elementary packets" of energy have not been created and can not be destroyed (on the ground of the first law of thermodynamics). QS are a-temporal in the sense that for their existence no change (travel) of particles in a-temporal physical space (ATPS) is needed (3).

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Universe has at the same time a granular structure and a wave structure. QS constituting ATPS vibrate at the "basic frequency" $0.19 \cdot 10^{44} s^{-1}$, have a "basic energy" given by **E**qs = $1.26 \cdot 10^{10} J$, and change their electrical charge from positive to negative in a Planck time ($5.39 \cdot 10^{-44} s$).

QS which build up ATPS have no entropy, their potential energy is constant. Instead, subatomic particles are composed by QS that vibrate at appropriate frequencies (lower than the basic one) and are endowed with entropy. Finally, QS composing electromagnetic waves vibrate at the frequencies of the electromagnetic spectrum, and are endowed with entropy too.

The wave structure of the universe is tied to two types of components: electromagnetic waves and quantum waves. In particular, the quantum waves are associated to the subatomic particles and rise thus as a consequence of the vibrations of the QS composing matter. One can say that these quantum waves guide the corresponding particles in their motion in agreement with Bohm's pilot wave theory. The role of quantum potential is to transfer a discrete quantity of entropic energy from one quantum of another of ATPS making thus a particle appear in the QS composing its trajectory (4).

In the universe one can observe only the increase of the entropy of inorganic matter, there is no evidence of increasing of the entropy of ATPS. ATPS is a non-entropy state of energy, inorganic matter is an entropy-state of energy. "Alive matter" is a negentropic state of energy. The process of evolution can be seen as a continuous stream of material change where organization of organic molecular systems is increasing towards the non-entropy state of ATPS.

2. EVOLUTION OF LIFE AND BASIC FREQUENCY OF ATPS

Because of the cyclic transformation "space-matter-space…" in the AGN-s, each arbitrary region of the universe has got an entropy that tends to zero with the increase of the stream of changes happening in ATPS. In particular, according to the research of our group, self-renewing universe with a total entropy that sums to zero implies that the relationship between the entropy S of a generic region composing physical universe and the stream of material changes μ_4 happening in ATPS can be expressed through the following formula (Sorli and Fiscaletti, 2005):

$$S = (K \ln P)\mu_4 \exp\left(-\frac{\mu_4}{A}\right),$$

where $\mu_4 = 0$ is conventionally chosen in correspondence to the beginning of the transformation, in AGN-s, of physical space into matter, i.e. after fresh gas begins to come out of AGN-s. In this equation K is Boltzmann constant, P is a parameter which indicates the disorder degree existing in the positions and motions of the material particles present in the region (and practically depends on the number of these particles) and A is a parameter strictly related to the maximum value that entropy can reach in the region during the evolution. Equation (Sorli and Fiscaletti, 2005) allows to explain and reproduce the increase of entropy of matter after fresh gas begins to come out of AGN-s (i.e. during the evolution of the universe corresponding to the formation of nuclei, atoms, stars and planets); at the same time, it allows to explain and reproduce the decrease of entropy concerning the evolution of life and conscious species in the regions of the universe which have similar physical circumstances to the earth.

According to an a-temporal model of the universe, QS have got different states of energy (entropic or non-entropic) as a consequence of the vibration at different appropriate frequencies. The wavefunction ψ of the generic quantum of space composing physical universe satisfies the following general equation (Rovelli, 2003):

$$\left|(\nu - \nu_{em}) \cdot (\nu - \nu_{ma})\right|\left(R_{\mu\eta} - \frac{1}{2} g_{\mu\eta} R\right)\psi + \left|\nu - \nu_P\right|\left(\vec{\nabla}^2 - \frac{1}{c^2}\frac{\partial^2}{\partial {\mu_4}^2} - \frac{\left|\nu - \nu_{em}\right| {l_P}^2 m^2}{\hbar^2}\right)\psi = 0,$$

or even better the equivalent equation (Sorli and Sorli, 2005a-c),

$$\left|\left(\nu-\nu_{em}\right)\cdot\left(\nu-\nu_{ma}\right)\right|\left(R_{\mu\eta}-\frac{1}{2}g_{\mu\eta}R\right)\psi+\left|\nu-\nu_{P}\right|\left(\vec{\nabla}^{2}-\frac{1}{c^{2}}\frac{\partial^{2}}{\partial\mu_{4}{}^{2}}-\frac{\left|\nu-\nu_{em}\right|l_{P}{}^{2}}{c^{2}}\frac{\delta Q}{\delta\psi}\right)\psi=0,$$

where ν is the frequency of vibration of the quantum, ν_{em} is a frequency of the electromagnetic spectrum, ν_{ma} is a frequency of a subatomic particle, ν_{P} is the "basic frequency", l_{P} is Planck length, $\left(R_{\mu\eta}-\frac{1}{2}g_{\mu\eta}R\right)$ is Einstein's gravitational tensor, *m* is the (eventual) mass of the quantum, *c* is the speed of light, and Q is the quantum potential. From equations (Rovelli, 2003; Sorli and Sorli, 2005a-c) it follows that it's the frequency of vibration that determines the peculiar features of the quantum of space. In fact, we have a quantum of space composing ATPS and satisfying thus equation

$$\left(R_{\mu\eta}-\frac{1}{2}g_{\mu\eta}R\right)\psi=0,$$

if $\nu=\nu_{P}$; we have a material quantum, satisfying equation

$$\left(\vec{\nabla}^{2}-\frac{1}{c^{2}}\frac{\partial^{2}}{\partial\mu_{4}{}^{2}}-\frac{\left|\nu_{ma}-\nu_{em}\right|l_{P}{}^{2}}{c^{2}}\frac{\delta Q}{\delta\psi}\right)\psi=0,$$

if $\nu=\nu_{ma}$; and we have a quantum of space composing electromagnetic waves, which satisfies equation $\left(\vec{\nabla}^{2}-\frac{1}{c^{2}}\frac{\partial^{2}}{\partial\mu_{4}{}^{2}}\right)\psi=0$, in the case $\nu=\nu_{em}$. Therefore, one can say that the fundamental physical entity which determines the change in the value of energy (and which can determine, eventually, also the change in the entropy) of a quantum of space is its frequency of vibration. According to equations (Rovelli, 2003; Sorli and Sorli, 2005a-c), the frequency of vibration of QS is the "driving force" which determines the features of the objects present in the universe.

To each value of μ_4 (i.e. of the numerical order of material changes happening in ATPS), there corresponds an appropriate value of the frequency of vibration ν of the generic quantum of space. In this regard, as the change in the entropy of a given region is strictly related to the change in the frequency of the QS composing it, one can assume that the relationship between the frequency of the generic quantum of space and the stream of changes happening in ATPS have a similar behaviour to that of the entropy (Sorli and Fiscaletti, 2005), i.e. that the term $\mu_4\exp\left(-\frac{\mu_4}{A}\right)$ must be present also in the expression of the frequency of the generic quantum of space. In particular, taking into account that for μ_4=0 (situation in which it begins the transformation, in AGN-s, of ATPS into matter) the QS vibrate at the "basic frequency", that successively it happens the cyclic transformation "space-matter-space-matter…" in AGN-s, and that therefore the universe is a self-renewing system with a total entropy that tends to zero, it derives the following relationship between the stream of material changes μ_4 happening in ATPS and the frequency of vibration ν of the generic quantum of space (Fiscalletti, 2003):

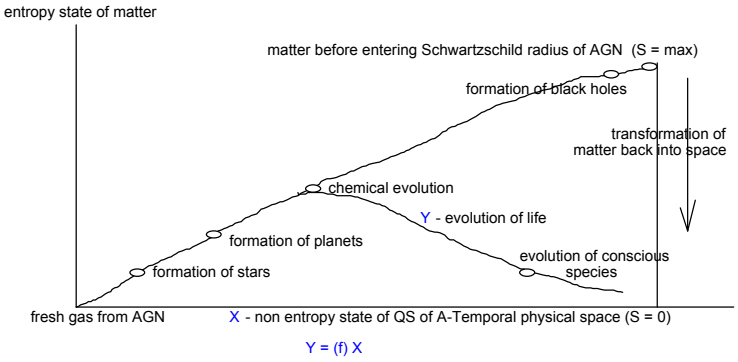
$$\nu = \nu_P - \mu_4 \exp\left(-\frac{\mu_4}{A}\right).$$

On the ground of equations (Sorli and Fiscaletti, 2005; Fiscalletti, 2003), one can now draw the following important results as regards the evolution.

In the centre of AGN-s, when density of quanta of ATPS in the area inside the Schwarzschild radius is at its maximum, energy of physical space begins to transform into energy of material particles ($\mu_4 = 0$). In this initial situation, the entropy of the generic region of the universe is equal to zero (which is its minimum value) while the frequency of QS is equal to the basic frequency ν_P . It must be underlined that the frequency of vibration of the QS constituting ATPS (i.e. the "basic frequency" ν_P) is the maximum frequency existing in nature, and that "basic frequency" means zero entropy. Then, for $\mu_4 > 0$ QS begin to change their state from non entropic to entropic (and therefore the frequencies of vibration from the value of the "basic frequency" become equal to appropriate values characteristic of subatomic particles). The first particles to form in ATPS are quarks and leptons (i.e. particles composed by one quantum of space). Therefore, in this first phase of evolution strong interaction among quarks is the prevalent ambient situation: as a consequence, we have certain appropriate frequencies of vibration of QS (characteristic of quarks) that give origin to the formation of nuclei. With the formation of nuclei, as in ATPS there are nuclei and electrons, ATPS assumes the special state represented by the electromagnetic field (in particular, the coulombian potential) acting between nuclei and electrons and this peculiar interaction gives origin to atoms. With the formation of many atoms, ATPS tends to assume the special state represented by the Van Der Waals interactions acting between atoms and this leads to the formation of molecules. In other words, with the presence of many atoms, a-temporal physical universe enters in the phase of chemical evolution which leads to the formation of more and more complex chemical aggregates.

Chemical evolution is the beginning of the negentropic process of biological evolution. Astronomical observations show that the whole observable space is permanently in a phase of chemical evolution. In the whole observable space there have been discovered basic organic molecules necessary for the development of life (5).

According to the model proposed here, one can say that organic molecules that are needed for the development of life are permanently generated in the whole observable space because of the "basic frequency" of QS that build up ATPS. "Basic frequency" of QS of ATPS is a physical environment for chemical evolution (it "generates" formation of organic molecules) that on the earth and the planets similar to the earth develops into life. Evolution of life is a continuous negentropic process and it can be described as a "function" Y=f(X) determined by the "basic frequency" of QS.



During the processes of formation of subatomic particles, nuclei, atoms, molecules, stars and planets (i.e. until the beginning of chemical evolution), on the ground of equation (Sorli and Fiscaletti,

2005) the entropy of the generic region of the universe increases and reaches its maximum $S_{\max} = (K \ln P)\frac{A}{e}$ for $\mu_4 = A$, which is just the numerical order of changes corresponding to the beginning of chemical evolution (situation in which the amount of matter is at its maximum, in other words is in equilibrium with the density of physical space existing inside AGN-s). At the same time, in virtue of equation (Fiscalletti, 2003) the frequency of vibration ν of QS composing the generic region of the universe tends to decrease and reaches its minimum value $\nu_{\min} = \nu_P - \frac{A}{e}$ for $\mu_4 = A$ itself. Then, for $\mu_4 > A$ with the process of chemical evolution we have at the same time the formation of organic molecules: therefore in the universe it begins also the biological evolution and there form cellules, pluricellular beings and living organisms. Equation (Sorli and Fiscaletti, 2005) implies that for $\mu_4 > A$ (and thus during the biological evolution) entropy starts to decrease. Equation (Fiscalletti, 2003) implies that for $\mu_4 > A$ the frequency of vibration of the generic quantum of space tends to increase: living organisms have a tendency to develop into systems composed of QS with higher frequency. One can predict that at the limit of bigger and bigger numerical order of changes, i.e. with the evolution of human being and his consciousness, entropy tends to become smaller and smaller while the frequency of QS tends to become bigger and bigger. In particular, one can say that in the phase of conscious experience of man (i.e. $\mu_4 \to +\infty$), entropy will tend to zero and the corresponding frequency of QS will approach to the "basic frequency".

On the ground of the model here proposed, QS vibrating at the "basic frequency" can be therefore considered the "elementary driving forces" of the evolution. One can say that the basic frequency of QS is a "physical environment" in which matter has a continuous tendency to develop towards conscious species. Physical evolution, chemical evolution, biological evolution and conscious evolution of man can be considered processes generated by the basic frequency of QS. In fact, during the first phases of evolution of the universe corresponding to the transformation of energy of the physical space in energy of the matter (i.e. until the beginning of chemical evolution), the entropy of the universe tends to increase and the frequency of QS tends to transform from the value given by the "basic frequency" to other appropriate values (lower than the basic one) characteristic of material particles. Then, with the beginning of the chemical evolution, which leads to the formation of organic molecules and therefore determines also the biological evolution of the universe, entropy tends to decrease and the corresponding frequency of vibration of QS tends to become bigger and bigger and, at the limit, will approach to the "basic frequency" with the evolution of the human being and his development beyond the mind.

Universe is physically homogeneous. ATPS has the same physical properties in the whole universe. By considering "basic frequency" of ATPS as its driving force, evolution can be understood as an universal process, as an integral part of cosmic dynamics (6, 7).

3. BASIC FREQUENCY OF ATPS AND CONSCIOUSNESS

Basic frequency of QS of ATPS is here considered as consciousness. Also researches done by Penrose and Hameroff see consciousness as a non local phenomenon that is not only the result of the processes of the brain. Their researches suggest that the force of quantum gravity acting on the mass of neurones within the brain may be responsible for the emergence of consciousness. The process is fundamentally related to the influence of quantum gravity on microtubule networks within the neurones (8, 9).

Experiment with earthworms shows that gravity works on living organism stronger than on the same dead organism. The weight of the living organism is bigger than the weight of the same dead organism. Experiment shows that there is an active relation between life and gravitational force of ATPS. Gravitation works stronger on the living neurones than on the same dead neurones (10).

When human brain enters in "tune" with the "basic frequency" of ATPS one enters into "conscious experience" of the world. One experiences time and space directly, without elaboration of the mind (11).

Man's "tuning" with consciousness is a part of cosmic dynamics. We have to develop beyond all the mind identifications that are the source of religious, racial and political tensions. Discovery of consciousness is a "natural protection" against destruction. A man that is in tune with consciousness can only create things that support life and development of human race.

4. CONCLUSIONS

One has to take into account that life on the earth occurs in the whole universe. This new "cosmic approach" goes beyond the "geocentric" approach. It sees evolution as an universal negentropic process that develops towards the "basic frequency" of ATPS.

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